

A new country record and additions to the moss floras of Luzon and Mindanao islands, Philippines

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Abstract

One new record and new locality information for fifteen species of Philippine mosses are reported for Luzon and Mindanao Islands. Of these *Physcomitrium eurystomum* Sendtn. and *Syrrhopodon albidus* Thwaites & Mitt. are new records for Luzon Island. The former taxon is also new for the Philippines. The remaining taxa: *Barbella convolvens* (Mitt.) Broth., *Chaetomitrium pseudoelongatum* Broth., *Clastobryum caudatum* M.Fleisch., *Distichophyllum osterwaldii* M.Fleisch., *D. tortile* Dozy & Molk. ex Bosch & Sande Lac., *Gemmabryum exile* (Dozy & Molk.) J.R.Spence & H.P.Ramsay, *Macrothamnium hylocomioides* M.Fleisch., *Meteoriella soluta* (Mitt.) S.Okamura, *Plagiommium integrum* (Bosch & Sande Lac.) T.J.Kop., *Racomitrium subsecundum* (Hook. & Grev.) Mitt. & Wilson, *Rhamphidium dixonii* E.B.Bartram, *Schlotheimia macgregorii* Broth. & Geh., *Scopelophila cataractae* (Mitt.) Broth., and *Taxithelium planissimum* Broth. are new records for Mindanao Island.

Introduction

The last twenty years have witnessed a series of new publications dealing with the Philippine moss flora not only for Luzon (Linis and Tan 2008, 2010, 2013, Linis 2014) but also for Mindanao (Azuelo *et al.* 2015, Tan and Shevock 2014, 2015) and its adjacent islands, Camiguin, for example (Linis 2010). The latest information provided by these new publications have increased our knowledge about the moss flora of these islands, and there are now 645 species in 229 genera known from Luzon Island and 362 species in 152 genera known for the island of Mindanao.

Continued studies of the many unidentified bryological collections kept at the Philippine National Herbarium (PNH) and the recent bryological explorations conducted by the author in Luzon and Mindanao Islands, however, have resulted in new locality information of two moss taxa for Luzon and fourteen moss taxa for Mindanao islands. With the addition of these new records, Luzon now has a moss flora consisting of 647 species in 230 genera while the current moss flora of Mindanao Island now has 376 species in 156 genera.

One Philippine new record and fifteen noteworthy new moss records for Luzon and Mindanao Islands are reported below. These new records have been verified with recent publications such as Azuelo *et al.* (2015), Linis (2004, 2006, 2009, 2010, 2014), Linis and Tan (2008, 2010, 2013), Lubos (2007), Tan and Iwatsuki (1991), Tan *et al.* (2000) and Tan and Shevock (2014, 2015). Voucher specimens of these novelties are kept in the PNH with some duplicates distributed to other herbaria such as De La Salle University (DLSUH) in Manila, Philippines and the Singapore Botanic Gardens (SING). Listing of species are in alphabetical order for ease of reference.

Philippine new records for Luzon Island

***Physcomitrium eurystomum* Sendtn.** Denkschriften der Bayerischen Botanischen Gesellschaft in Regensburg 3: 142. 1841. (Funariaceae)

This widely distributed moss taxon from the north temperate region is reported here not only as a new record for Luzon island but also for the entire Philippine archipelago. *Physcomitrium eurystomum* Sendtn. is characterized by solitary plants with erect- cup-shaped capsules (Fig. 1). Like any species of *Physcomitrium*, this plant is rather small and are locally found on mud on the edges of reservoir and agricultural lands. This finding of *P. eurystomum* in Luzon, is the third in the country for this genus along with *P. japonicum* (Hedw.) Mitt. from Negros Island (Tan and Iwatsuki 1991) and *P. sphaericum* (C.Ludw.) Fürnr. from the Bicol Peninsula, also from island of Luzon (Linis 2014).

According to Enroth (1991), *Physcomitrium eurystomum* appears to be closely related to *P. japonicum*. However, *P. eurystomum* has distinctive collenchymatous exothelial cells on its young capsules while its spores are rather blackish-brown in color and densely spinulose (Ochi 1968). *Physcomitrium eurystomum* is quite similar to *P. sphaericum* in general appearance. However, the former has longer seta (9–10 mm) and larger spores (c. 30 µm in diameter) compared to *P. sphaericum* which has shorter seta (below 2 mm) and smaller spores (c. 25 µm in diameter) (Eddy 1996).

Extra-Philippine Distribution: Widely distributed in the Old World of the northern hemisphere (Ochi 1968, Corely *et al.* 1981, Noguchi and Iwatsuki 1988, Enroth, 1991, Ignatov and Afonina 1992, Eddy 1996).

Intra-Philippine Distribution: New to the Philippines.

Specimens examined: Mount Santo Tomas, Municipality of Tuba, Benguet province, Luzon Island, Philippines, on moist soil bank beside agricultural field, 1917 masl, 16° 21.5' N 120° 33.8' E, 15 Nov 2017, V.C. Linis 5187-17 (PNH; DLSUH)

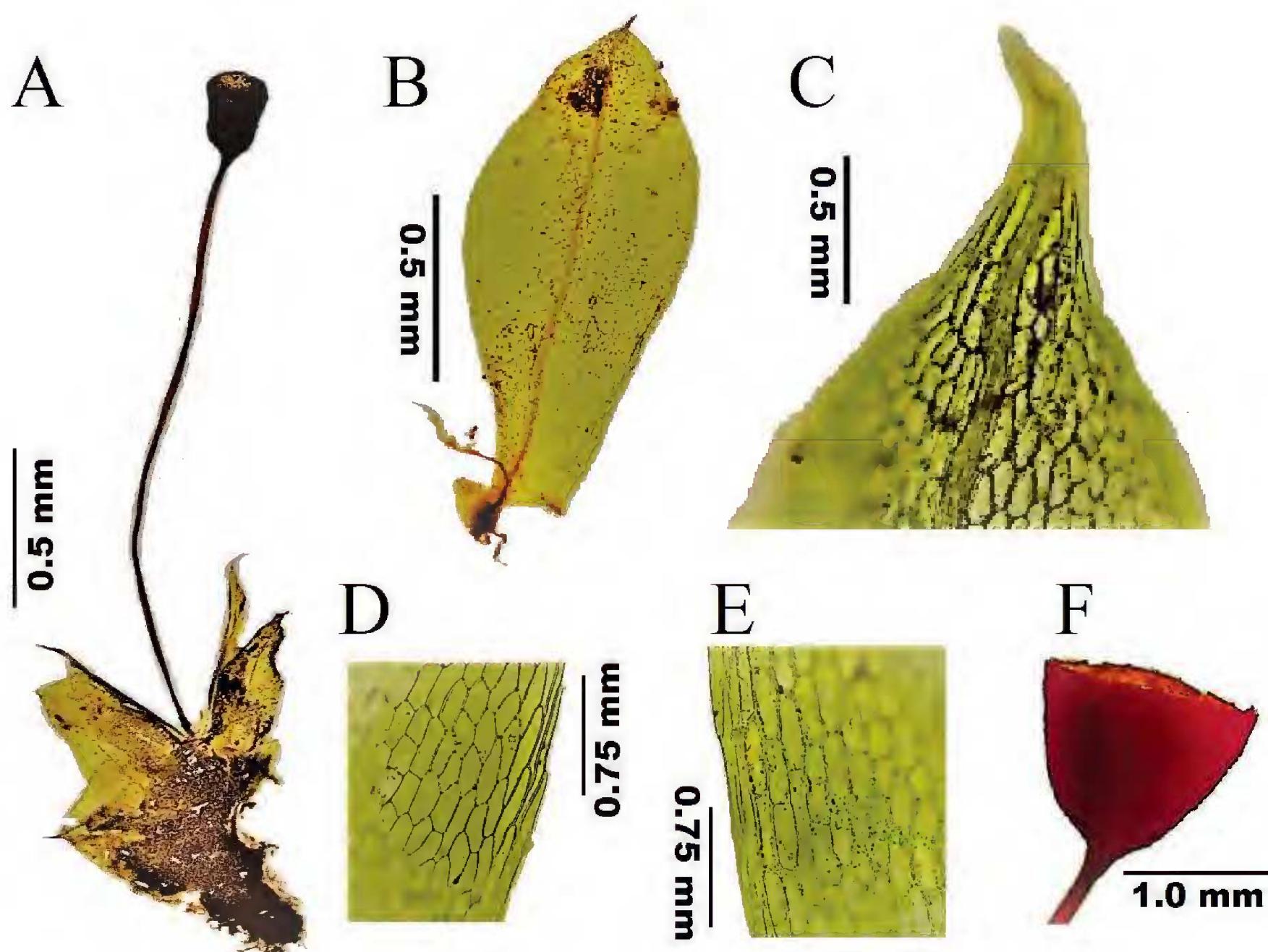


Fig. 1. *Physcomitrium eurystomum* Sendtn. A. habit; B. leaf displaying shape and apex; C. close-up of leaf apex with apiculate tip; D. leaf margin near leaf apex; E. leaf margin at mid-leaf; F. cup-shaped capsule. (Figure developed by V. C. Linis).

Syrrhopodon albidus Thwaites & Mitt. Journal of the Linnean Society, Botany 13: 298. 1873. (Calymperaceae)

This is the first confirmed report of *Syrrhopodon albidus* in Luzon Island. According to Tan and Iwatsuki (1991), the occurrence of this taxon in the Philippines was reported by Mohamed and Reese (1985), Reese and Mohamed (1985) and Orbán and Reese (1990) but none of these provided locality information. Another taxon, *S. prolifer* Schwägr., treated by Tan and Iwatsuki (1991) as distinct from *S. albidus*, was reported to occur in Mindanao. Orbán and Reese (1990) merged *S. prolifer* and *S. albidus* under a new combination, *S. prolifer* var. *albidus* to include all Sri Lankan, Malesian up to the Oceanian populations of this complex. This, too was mentioned to occur in the Philippines by Orbán and Reese (1990) but did not cite the taxon's exact location. Ellis (2005), having altered the status quo of several Old World taxa included within the *S. prolifer* complex, reinstated *S. prolifer* var. *albidus* at the level of species as *S. albidus*.

Syrrhopodon albidus, like other former varieties of the *S. prolifer* complex that have now been reinstated or recognized as separate taxa (Ellis 2003, 2005), are commonly found with neither sporophytes nor gemmae. Furthermore, all these taxa have very short stems that contribute to their "stemless" appearances, mostly corticolous and with leaves bordered all around by elongate, hyaline cells. However, specimens of *S. albidus* have cells in the chlorophyllose lamina with one or two low papillae which is very distinctive from the chlorophyllose cells of other taxa with either multiple low papillae or tall multifid papillae. In the field, plants of *S. albidus* are like those of *S. tosaensis* Cardot distributed from Japan, southeastern China to Thailand but differ having generally larger cells in the chlorophyllose lamina. In addition, the leaves of *S. albidus* have margins entire at the shoulders, in contrast to the frequently toothed leaf shoulders of *S. tosaensis*.

Extra-Philippine Distribution: Pantropical (Eddy 1988, Orbán and Reese 1990). **Intra-Philippine Distribution:** Mindanao (Tixier 1978, Tan and Iwatsuki, 1991).

Specimen examined: North slope of Mount Isarog, Province of Camarines Sur, Luzon Island, on trunk of tree fern, 14 May 1991, *Cabalguinto* 2139 (PNH).

New moss records for Mindanao Island

Barbella convolvens (Mitt.) Broth. Die Natürlichen Pflanzenfamilien I(3): 824. 1906. (Pterobryaceae)

This Himalayan–East Malesian taxon was earlier reported by Tan & Iwatsuki (1991) from Mount Talinis, Negros island in the Philippines. Fertile of plants of this taxon are distinguished from other members of Meteoriaceae by having scabrous seta with similar lengths as its capsules (Noguchi 1976). Among its congeners, *Barbella convolvens* differs by having filiform stems with complanate branches and capsules with apophysis at the base. Its branch leaves are widely spreading, oblong, subulate at apices which become undulate along mid-margins.

Extra-Philippine Distribution: Ceylon, India, Himalayas, Thailand, Borneo, Sumatra, Java, and Sulawesi (Noguchi 1976). **Intra-Philippine Distribution:** Negros (Tan and Iwatsuki 1991).

Specimen examined: Mount Hamiguitan, Davao Oriental province, Mindanao Island, on tree branches, Transitional lowland forest, 850 masl, 19 Apr 2007, V.C. *Linis* 2418-07 (PNH).

Chaetomitrium pseudoelongatum Broth. Monsunia, Beiträge zur Kenntniss der Vegetation des Süd- und Ostasiatischen Monsungebietes 1: 47. 1899. (Hookeriaceae)

Both Brotherus (1900) and Bartram (1939) reported *Chaetomitrium pseudoelongatum* as endemic to the island of Tawi-Tawi. This gathering extends further its range to Mindanao Island.

Apart from *Chaetomitrium pseudoelongatum* Broth., there are six other taxa of *Chaetomitrium* reported in Malesia having blunt or truncate branch leaves, namely: *C. darnaedii* H.Akiy. & M.Suleim.; *C. elmeri* Broth.; *C. elongatum* (Dozy & Molk.) Dozy & Molk.; *C. perarmatum* Broth.; *C. schofieldii* Tan & Robins.; and *C. warburgii* Broth. Among these six taxa, *C. darnaedii*, *C. elmeri* and *C. perarmatum* are most distinct from *C. pseudoelongatum* since these taxa have lamina cells spinose or tuberculate on dorsal surfaces of their leaves. On the other hand, smooth leaf lamina cells are shared by *C. pseudoelongatum* with *C. elongatum*, *C. schofieldii* and *C. warburgii* (Tan and Robinson 1990). However, *C. schofieldii* has branches with seriate foliations and smooth seta (c. 10 mm long) while the three other taxa, *C. pseudoelongatum*, *C. elongatum* and *C. warburgii*, have variously foliated branches and weakly papillose seta. Both *C. elongatum* and *C. warburgii* have entire or crenulate upper leaf margins which contrast with the sharply serrate upper leaf margins of *C. pseudoelongatum* (Akiyama and Suleiman 2001).

Extra-Philippine Distribution: Endemic to the Philippines (Tan and Iwatsuki 1991, Akiyama and Suleiman 2001). **Intra-Philippine Distribution:** Tawi-Tawi (Tan and Iwatsuki 1991).

Specimens examined: Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao island, on stem of small tree in forest, Secondary lowland forest, 850 masl, 17 May 2008, Linis 3553-08 (PNH); Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao Island, high on small branches, almost pendulous; Transitional lowland forest, 1020 masl, 17 May 2008, Linis 3610-08 (PNH).

Clastobryum caudatum M.Fleisch. Die Musci der Flora von Buitenzorg 4: 1190, 196 f. 13. 1923. (Sematophyllaceae)

The taxon, *Clastobryum caudatum* M.Fleisch. consists of small epiphytic plants with erect-spreading leaves with filamentous, brood, bodies borne on attenuated branches (Tixier 1969, 1977, He 2005). It is most similar to *C. papillosum* R.S.Williams and *C. indicum* (Dozy & Molk.) Dozy & Molk. for having ovate-lanceolate leaves with alar cells in one rank at the base. However, *C. papillosum* have leaves with serrate apices and papillose leaf lamina cells with moderately thick walls. As in *C. caudatum*, the leaf apices of *C. indicum* are never serrate but tend to be gradually acute to short-acuminate in shapes. The leaf apices of *C. caudatum* are long-acuminate (Tan and Buck 1989).

Clastobryum caudatum can be confused with *Clastobryophilum bogoricum* (Bosch & Sande Lac.) M.Fleisch. with records in Luzon and Sibuyan islands (Tan and Iwatsuki 1991). The leaves of *C. caudatum*, however, tend to have wide bases which abruptly narrow into long acuminate apices. Furthermore, the leaf margins of *C. caudatum* are often recurved, at least one side, toward the upper halves of the leaves, features which are not normally observed among the narrowly linear-lanceolate leaves of *Clastobryophilum bogoricum*.

Extra-Philippine Distribution: Java (Fleischer 1923) and Thailand (Dixon 1932). **Intra-Philippine Distribution:** Mindoro (Tan and Iwatsuki 1991, Linis 2009).

Specimens examined: Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao Island, on base of bamboo clump, Agricultural land, 550 masl, 15 May 2008, V.C. Linis 3486-08 (PNH); Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao Island, on tree branch, Transitional lowland forest, 1020 masl, 17 May 2008, V.C. Linis 3599-08 (PNH).

Distichophyllum osterwaldii M.Fleisch. Die Musci der Flora von Buitenzorg 3: 994. 170 a-g. 1908. (Hookeriaceae)

This taxon is the largest among the *Distichophyllum* so far reported from the Philippines (Tan and Robinson 1990). Its large, spathulate leaves with an undifferentiated upper leaf border (He 2002) set the taxon apart from the rest of the Philippine *Distichophyllum* species. Another new Mindanao record of *Distichophyllum*, *D. tortile* Dozy & Molk. ex Bosch & Sande Lac., reported below, also has comparably large leaves but its leaf cells are large and relatively homogenous in the upper half of the leaf.

Extra-Philippine Distribution: China (Lin and Tan 1995), Japan (Ryukyu islands), Taiwan, Borneo and Java (Noguchi *et al.* 1991). **Intra-Philippine Distribution:** Luzon, Mindoro, Negros and Leyte (Tan and Iwatsuki, 1991).

Specimen examined: Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao, on small tree stems; Transitional lowland forest, 1120 masl, 15 May 2008, V.C. Linis 3634-08 (PNH).

Distichophyllum tortile Dozy & Molk. ex Bosch & Sande Lac. Bryologia Javanica 2: 27. 152. 1862. (Hookeriaceae)

This rather uncommon but distinctive taxon can attain the size of *Distichophyllum osterwaldii* M.Fleisch. (Tan and Robinson 1990). However, plants of *D. tortile* have large, homogenous thin-walled lamina cells (c. 20 µm in diameter) from margins to costa in the upper half of the leaves (He 2002). *D. osterwaldii* has leaf lamina cells similar in size but are distinctively smaller towards the margins compared to those found near the costa (paracostal cells). The only other *Distichophyllum* taxon with similar homogenous leaf lamina cells is *D. cucullatum* E.B.Bartram, also reported to occur in Mindanao (Tan and Iwatsuki 1991). However, *D. cucullatum* has cucullate leaf apices which are generally round or ending in a very short mucro. In contrast, the leaf apices of *D. tortile* are not cucullate which are generally obtuse and apiculate in forms.

Extra-Philippine Distribution: Indochina, Malay Peninsula, Borneo and Java (Tan and Robinson 1990). **Intra-Philippine Distribution:** Luzon (Tan and Iwatsuki 1991); Mindoro (Linis 2009).

Specimens examined: Mount Timpoong, Camiguin province, Camiguin Island, on wet rocks, Montane forest, 1250 masl, 21 May 2017, V.C. Linis 2536-07 (PNH), Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao, on moist rock; Transitional lowland forest, 1120 masl,

17 May 2008, V.C. Linis 3623-08 (PNH); Mount Balatukan, Cordillera Central Range, Misamis Oriental province, Mindanao, on wet boulders adjacent to creek, Lower montane forest, Transitional lowland forest, 1981 masl, 08° 43.8' N 125° 00.2' E, 06 Nov 2010, V.C. Linis 4628-10 (PNH)

Gemmabryum exile (Dozy & Molk.) J.R.Spence & H.P.Ramsay. *Phytologia* 87(2): 67. 2005. (Bryaceae)

Spence (2005) transferred *Brachymenium exile* (Dozy & Molk.) Bosch & Sande Lac. under the new genus *Gemmabryum* as *Gemmabryum exile* (Dozy & Molk.) J.R.Spence & H.P.Ramsay. Distinctively small and glossy, *G. exile* is one of the smaller *Gemmabryum* species which can be easily identified in the field by its neat, string-like barren stems and erect ovoid capsule with distinct rugose apophysis (Eddy 1996). *Gemmabryum exile* is quite common in northern Luzon, where it is found on soil, rocks and walls in both natural and anthropogenic habitats over a wide altitudinal range. The more widespread *G. coronatum* which can be found in similar habitats, also has rugose apophysis. However, the capsule of *G. coronatum* is always short-cylindrical and pendulous. This collection of *G. exile* is new to Mindanao island.

Extra-Philippine Distribution: Pantropical and subtropical (Eddy 1996). **Intra-Philippine Distribution:** Luzon and Negros (Tan and Iwatsuki 1991).

Specimens examined: Mount Balatukan, Cordillera Central Range, Misamis Oriental province, Mindanao, on exposed moist thin soil, Transitional lowland forest, 1432 masl, 08° 43.9' N 125° 00.3' E, 06 Nov 2010, V.C. Linis 4499-10 (PNH); Mount Balatukan, Cordillera Central Range, Misamis Oriental province, Mindanao, on exposed soil, Transitional lowland forest, 1432 masl, 08° 43.9' N 125° 00.3' E, 06 Nov 2010, V.C. Linis 4514-10 (PNH).

Macrothamnium hylocomioides M.Fleisch. *Nova Guinea* 2: 125. 34A. 1914. (Hylocomiaceae)

In the field, *Macrothamnium hylocomioides* M.Fleisch. is essentially indistinguishable from the more widespread *M. macrocarpum* (Reinw. & Hornsch.) M.Fleisch. in terms of size and overall macroscopic appearance. According to Noguchi (1972), *M. hylocomioides* can be recognized from *M. macrocarpum* by its stem leaves which are reniform, not or slightly decurrent, with abruptly pointed and recurved leaf apices (Koponen and Norris 1985). On the other hand, *M. macrocarpum* has broadly cordate stem leaves which are distinctly decurrent and acute at the apex. Rohrer (1985) stated that the stem leaves of *M. hylocomioides* are wider in proportion to its length (0.7–1.0: 1) while those of the *M. macrocarpum* are longer than wide (1.0–1.3). Before this current report about the occurrence of this taxon in Mindanao, *M. hylocomioides* was only known from Luzon in the Philippines.

Extra-Philippine Distribution: New Guinea (Noguchi 1972, Koponen and Norris 1985). **Intra-Philippine Distribution:** Luzon (Tan and Iwatsuki 1991).

Specimens examined: Mount Apo, Cordillera Central Range, Davao del Sur province, Mindanao, on decaying wood, Upper montane forest, 2718 masl, 06° 59.693' N 125° 16.204' E, 11 Feb 2011, V.C. Linis 4996-11 (PNH); Mount Apo, Cordillera Central Range, Davao del Sur province, Mindanao, on lower tree trunk, Upper montane forest, 2900 masl, 06° 59.693' N 125° 16.204' E, 12 February 2011, V.C. Linis 5014-11 (PNH).

Meteoriella soluta (Mitt.) S.Okamura. *Journal of the College of Science, Imperial University of Tokyo* 36(7): 18. 1915. (Hylocomiaceae)

For many years, *Meteoriella soluta* (Mitt.) S.Okamura was known only in northern Luzon (Tan and Iwatsuki 1991) which is geographically close to Eastern Asia. However, this paper now reports that this species is also present in Mindanao. This indicates that *M. soluta* should not belong to the Eastern endemic taxon but should be treated under another phytogeographical category. Additional searches of this taxon south of Mindanao may reveal that this species has a broader range than was previously thought. A good illustration of *Meteoriella soluta* is shown in Manuel (1976).

Study by Wang *et al.* (2010) using morphological and molecular data placed *M. soluta* under the family of Hylocomiaceae, even though it has been traditionally classified either under family Pterobryaceae or Meteoriaceae. Within the Hylocomiaceae, *M. soluta* is phylogenetically closest to the genus *Leoskeobryum*. While *M. soluta* shares some features with species of Meteoriaceae and Pterobryaceae such as pendent shoots, the lack of well-developed central strands in the stem, erect capsules and reduced peristomes, these features are most likely to be products of convergent evolution in epiphytic habitats (Hedenäs 2001, Huttunen *et al.* 2004, Quandt and Huttunen 2004).

Extra-Philippine Distribution: Sikkim, Bhutan, Assam, China, North Vietnam, Taiwan and Japan (Koponen 1972, 1981, Manuel 1976). **Intra-Philippine Distribution:** Luzon (Tan and Iwatsuki 1991).

Specimen examined: Mount Balatukan, Cordillera Central Range, Misamis Oriental province, Mindanao Island, pendulous on tree branches, Upper montane forest, 08° 44.9' N 124° 59.5' E, 06 Nov 2010, 2300 masl, V.C. Linis 4645-10 (PNH).

Plagiomnium integrum (Bosch & Sande Lac.) T.J.Kop. Hikobia 6: 57. 1971. (Mniaceae)

This is the second species of *Plagiomnium* reported for Mindanao Island and in most respects it is like the more common *P. succulentum*. On the average, however, *P. integrum* is smaller than the latter in all its parts. In addition, the leaf border of *P. integrum*, even in weaker states, is more strongly developed than in *P. succulentum*, often yellowish, with up to 5 cells wide below mid-leaf compared to the leaf border of *P. succulentum* which are only 1–2 cells wide throughout (Koponen 1981). *Plagiomnium integrum* is also definitely separated from *P. succulentum* by its smaller, slightly thickened and sometimes with pitted walls, leaf lamina cells, 25–35 µm in its longest diameter. The thinner leaf lamina cells of *P. succulentum* can reach up to 70 µm or more in diameter and are therefore, twice as large as those of *P. integrum*.

Extra-Philippine Distribution: India, Nepal, Burma, Taiwan, Borneo, Indonesia (Koponen 1972, 1981).

Intra-Philippine Distribution: Luzon (Tan and Iwatsuki 1991).

Specimen examined: Vicinity of Lake Agco, Mt. Apo (West slope), Kidapawan City, North Cotabato province, Mindanao, on wet rocks near brook, Secondary lower montane forest, 1200 masl, 07° 01.142' N 125° 13.388' E, 09 Feb 2011, V.C. Linis 4818-11 (PNH).

Racomitrium subsecundum (Hook. & Grev.) Mitt. & Wilson. Hooker's Journal of Botany and Kew Garden Miscellany 9: 324. 1857. (Grimmiaceae)

Reports of *Racomitrium subsecundum* (Hook. & Grev.) Mitt. & Wilson in the Philippines were mainly confined to Luzon Island (Tan and Iwatsuki 1991). This collection extends the distribution range of *R. subsecundum* and the genus to Mindanao Island. *R. subsecundum* is endemic to Malesia (Eddy 1996).

Characteristic of its genus, the leaf lamina cells of *R. subsecundum* are long and narrow with thin transverse walls but with strongly thickened and nodulose longitudinal walls. Known to be variable in its size and growth forms, the short, dentate hair points found in its muticous leaves will easily distinguish *R. subsecundum* from *R. fasciculare* (Schrad. ex Hedw.) Brid., the other Philippine species of *Racomitrium*.

Extra-Philippine Distribution: Known from India, Nepal, Sikkim, Bhutan, Sri Lanka, China, Taiwan, Borneo, Sumatra and Java in Asia, Papua New Guinea, southern Mexico, Guatemala and the Dominican Republic in Central America. Could also be found in South America. (Frisvoll 1988). **Intra-Philippine Distribution:** Luzon (Tan and Iwatsuki 1991).

Specimen examined: Vicinity of Lake Venado, Mt. Apo (West slope), North Cotabato province, Mindanao island, on tree trunk, Upper montane forest, 2377 masl, 10 Feb 2011, 07° 00.263' N 125° 16.088' E, V.C. Linis 4927-11 (PNH).

Rhamphidium dixonii E.B.Bartram. Philippine Journal of Science 68: 109. f. 129. 1939. (Ditrichaceae)

The author's Mindanao collection is only the second known gathering of *Rhamphidium dixonii* E.B.Bartram. The species' original collection was from Canlaon Volcano where it grew terrestrially on deeply, shaded acid soils. Sterile *R. dixonii* can easily be mistaken for a *Microdus* Schimp. ex Besch. due to its growth habit. However, fertile plants of this taxon can be identified by the presence of 16 erect filiform, papillose processes to 200 µm long in the peristomes.

The genus *Rhamphidium* is not very well understood at the present time. Its systematic position is obscure although it appears to combine Pottiod sporophytic features with that of a more Dicranoid gametophytic characteristics. True affinities of *Rhamphidium* need to be ascertain.

Extra-Philippine Distribution: Endemic to the Philippines (Bartram 1939, Eddy 1988, Tan and Iwatsuki 1991). **Intra-Philippine Distribution:** Negros (Tan and Iwatsuki 1991).

Specimen examined: Vicinity of Lake Venado, Mt. Apo (West slope), North Cotabato province, Mindanao island, on soil bank beside trail, Upper montane forest, 2377 masl, 10 Feb 2011, 07° 00.263' N 125° 16.088' E, V.C. Linis 4928-11 (PNH).

Schlotheimia macgregorii Broth. & Geh. Öfversigt af Finska Vetenskaps-Societetens Förhandlingar 40: 170. 1898. (Orthotrichaceae)

This is the second locality reported for *Schlotheimia macgregorii* Broth. & Geh. in the Philippines. The first report for this taxon are from Mount Baloy in Panay Island (Linis and Tan 2010). The Mindanao plants of *S. macgregorii* Broth. & Geh. are generally smaller and much slenderer than the more widespread *S. wallisii*

C.Müll. The former can be identified with ease, when moist, with its conspicuous strongly recurved-squarrose leaves which are erect-spreading to patent in *S. wallisii*. In fertile plants of *S. macgregorii*, the squarrose-recurved perichaetal leaves are conspicuous, always projecting well above the normal leaves on female branches. Perichaetal leaves of *S. emarginatopilosa* Herzog, another *Schlotheimia* taxon reported in the Philippines, are similarly conspicuous but these leaves are erect instead of being squarrose-recurved.

Extra-Philippine Distribution: Sulawesi, Ceram, New Guinea (Eddy 1996). **Intra-Philippine Distribution:** Panay (Linis and Tan 2010).

Specimens examined: Mount Balatukan, Cordillera Central Range, Misamis Oriental province, Mindanao, on lower branch of medium-sized tree, Lower montane forest, 1981 masl, 08° 43.8' N 125° 00.2' E, 06 Nov 2010, V.C. Linis 4609-10 (PNH); Marbel River trail leading to Lake Venado, Mt. Apo (West slope), North Cotabato province, on tree branch, Transitional lowland forest, 1345 masl, 07° 01.218' N 125° 13.864' E, 10 Feb 2011, V.C. Linis 4915-11 (PNH); Mount Apo, Cordillera Central Range, North Cotabato province, Mindanao, on tree branch, Upper montane forest, 2900 masl, 06° 59.693' N 125° 16.204' E, 12 Feb 2011, V.C. Linis 5027-11 (PNH).

Scopelophila cataractae (Mitt.) Broth. *Die Natürlichen Pflanzenfamilien* I(3): 436. 1902. (Pottiaceae)

This moss taxon is almost similar in habit to *Scopelophila lingulata* (Spruce) Spruce, also reported to occur in Mindanao. In its encountered form, *S. cataractae* appears to resemble species of *Anoectangium* bearing similar leaf outlines and tomentose stems. The leaves of the latter genus, however, have opaque, papillose leaves with contrasting pellucid costae. *Scopelophila cataractae* differs from *S. lingulata* by the presence of a small hyaline leaf base with differentiated margins composed of short, rectangular cells with firm calls. This hyaline leaf base is more extensive in *S. lingulata* which lacks the marginal bands of small cells that characterize *S. cataractae*.

Extra-Philippine Distribution: North America, China, Japan, Korea, Bhutan, India, Nepal, Indonesia and Papua New Guinea (Norris and Koponen 1989, Eddy 1990). **Intra-Philippine Distribution:** Luzon (Tan and Iwatsuki 1991).

Specimen examined: Mount Balatukan, Cordillera Central Range, Misamis Oriental province, Mindanao, on exposed mineral soils, Transitional lowland forest, 1432 masl, 08° 43.9' N 125° 00.3' E, 06 Nov 2010, V.C. Linis 4519-10 (PNH).

Taxithelium planissimum Broth. *Hedwigia* 50: 141. 1910. (Pylaisiadelphaceae)

The former Philippine endemic *Taxithelium ramicola* Broth., along with the Papuan taxon, *T. wewakense* E.B.Bartram are now treated as synonyms of *T. planissimum* Broth. (Camara 2011) which turns out to be more widespread than was previously thought. Before the report of this taxon in Mindanao, *T. planissimum* is known only in Luzon and Polillo Islands (Tan and Iwatsuki 1991).

Taxithelium planissimum slightly resemble the Malesian endemic *T. isocladum* (Bosch & Sande Lac.) Renaud & Cardot in terms of its size, leaf shapes and the absence of well-developed alar cells. The two taxa, however, differ in the cells found apices of their perichaetal leaves being smooth in *T. planissimum* and pluripapillose in *T. isocladum*. In addition, the opercula of *T. planissimum* are distinctly long-rostrate while that of the *T. isocladum* are conic to conic-rostrate. The seta of *T. planissimum* is longer compared to *T. isocladum*.

Extra-Philippine Distribution: Philippines (Brotherus 1913, Tan and Iwatsuki 1991), Gabon, Indonesia, Malaysia, Sri Lanka, Vietnam and New Guinea (Camara 2011). **Intra-Philippine Distribution:** Luzon (Brotherus 1913, Tan and Iwatsuki 1991) and Polillo (Tan and Iwatsuki 1991).

Specimen examined: Cordillera Central Range, Sitio Magantol, Barangay Busdi, Malaybalay City, Bukidnon province, Mindanao island, on small fallen tree branch, Transitional lowland forest, 1020 masl, 17 May 2008, V.C. Linis 3603-08 (PNH).

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